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# THE FORESTER.

An Illustrated Journal Devoted to Forestry

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VOLUME II.

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C. S. MAGRATH,  
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# "FOREST PLANTING"

*A Treatise on the Care of Timber Lands and the Restoration of Denuded Wood Lands on Plains and Mountains.*

By H. NICHOLAS JARCHOW, LL. D.

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The late Professor of Mining-Engineering at Columbia College, New York, General W. P. Trowbridge, to whom the proofs of this book were sent for an opinion, wrote to the author the following lines: "Dear Sir: I have read the proofs of your work on 'Forest Planting and Forest Preservation' with great interest. Its publication will be a timely and valuable contribution to knowledge on a subject, which, in this country, is just beginning to receive the attention which its importance demands. Your book will be a hand-book of information, thorough and complete in every department of forestry. Its conciseness and clearness are such as readily to suggest details, the insertion of which would have made the work more voluminous, and thus less acceptable to the large class of readers whom it is desirable to reach at the present time.

Very truly yours, W. P. TROWBRIDGE

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## The Forester

"To assist in preserving and protecting the woodlands of the State is the praise worthy purpose of the Forester."—Newark Evening News.

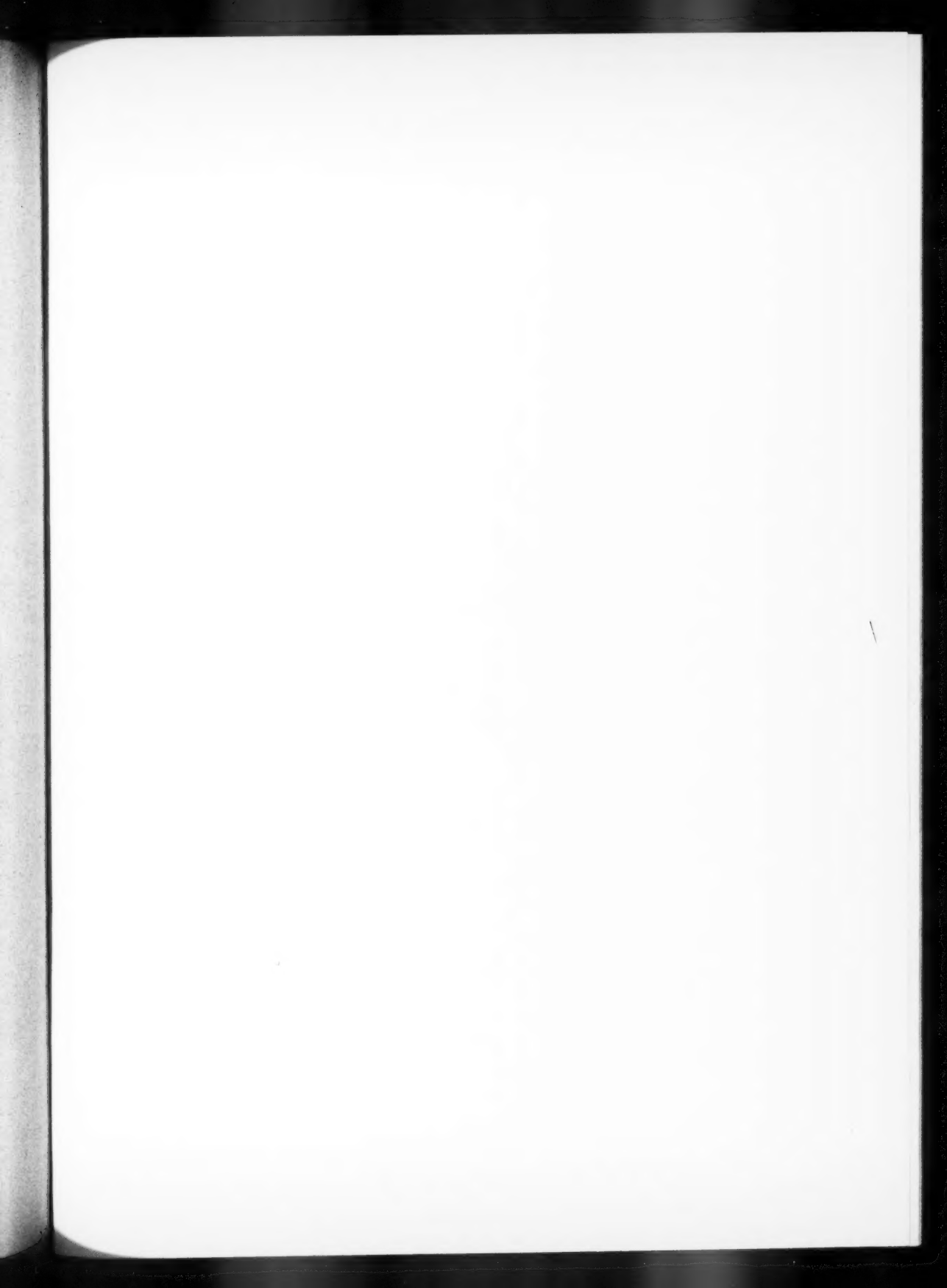
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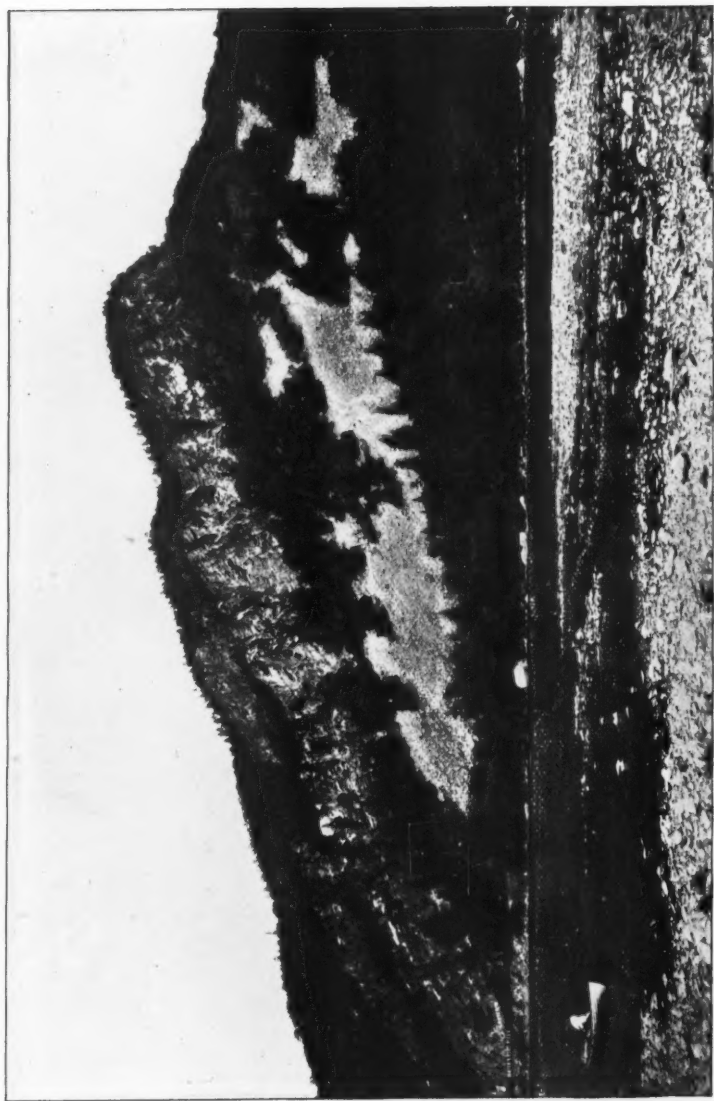
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JOHN GIFFORD,  
EDITOR,  
MAYS LANDING,  
N. J.





**Gave Mountain at Delaware Water Gap.**  
(Lent by the Geological Survey of New Jersey.)

# THE FORESTER.

VOLUME II.

DECEMBER 1, 1896.

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## THE FORESTER.

An Illustrated Journal Devoted to Forestry.

Official Organ of the New Jersey Forestry Association. Issued six times a year. Each issue contains sixteen pages of short articles pertaining to Arboriculture, Silviculture, the Preservation of Useful Birds, the Destruction of Harmful Insects, the Establishment of Parks and Reservations, Water Supply, Forest Legislation, Forest Influences, Forest Products, etc., etc.

FIFTY CENTS A YEAR IN ADVANCE.  
SINGLE COPIES, TEN CENTS.

Free to all members of the New Jersey Forestry Association.

Edited by JOHN GIFFORD, Mays Landing, N. J.,  
Assisted by NEWLIN WILLIAMS.

THE great advantage of having the mountains forested in the region of resorts has been often referred to in this journal. The Black Forest, for instance, is at the same time a great resort and a great lumber region. Besides the revenue from the forest, which is being increased by the construction of good roads, one of the great secrets of profit in forestry, a large amount of money is received from tourists who are attracted there mainly by the beauty of the forest. It is indeed a great mistake to neglect the forests in the region of American resorts. The frontispiece of this issue shows the bare mountain sides at Delaware Water Gap. Were wood worthless, and if the forest exerted no beneficial influences in the way of lessening the destructive forces of nature, it would be worth while to cover the waste places in the region of resorts with vegetation simply in order to improve their appearance.

WE hope that those interested in THE FORESTER will pardon the unavoidable

irregularity in its publication. It completes the second year of its existence with this issue, and not being a business enterprise and, of course, not lucrative financially, has been necessarily incomplete and irregular. It was begun in a modest way with little hope of being profitable or powerful. The number of persons interested in forestry has increased so rapidly, and THE FORESTER has been so favorably received, that we shall venture to issue it monthly during 1897. Each issue will contain at least one full page illustration. The subscription price will be seventy-five cents, but all new subscribers who send in their names before the end of 1896 may have it for fifty cents.

A great deal of educational work is necessary, and the distribution of literature on the subject is an important part of the propaganda. We hope, therefore, that those persons who are especially interested in forestry will subscribe for several copies each month and send them to friends and libraries. Ten copies will be supplied each month during 1897 to any person who will send five dollars.

We are confident that there is a place for a monthly journal of forestry in America, and although it will be devoted especially to the interests of New Jersey, it will contain articles of interest to the inhabitants of other States. We shall be grateful for contributions of any kind, and shall endeavor to enlarge and improve the journal as rapidly as possible.

It will contain short translations now



and then from European periodicals, and articles concerning the methods of forest management as applied in Europe. Each issue during 1897 will contain twelve pages of reading matter of as useful a quality as we are able to procure. We shall endeavor to give to our readers at least seventy-five cents worth of practical matter.

All books and pamphlets which are received, and which are deemed worthy of special mention, will be carefully reviewed. It will have nothing to do with horticulture and arboriculture, and will treat solely of the forest in all relations.

We shall endeavor to make it as scientific as possible, and at the same time in such a style that every ordinary person will be able to comprehend it. There is no surer way of insuring the prosperity of a nation than by keeping a fair percentage of its surface in well-cared for forests. Every owner of woodland should subscribe for *THE FORESTER*; every person who owns no land should show his interest in his country by subscribing for a journal the purpose of which is to aid in preventing devastation and in instituting the proper method of utilizing one of the most valuable of all resources.

Among the striking objects of interest displayed in the Forestry Pavilion of the Geneva Exposition was the cross section of a larch log, one and a half inches in diameter, with its surface dotted with small pegs, similar to the flags used to represent the location of troops on military maps. On the labels were noted the most important dates and events in Swiss history relating to political and internal development. The pegs were placed on the annual rings so as to indicate the corresponding age of the larch; for example, at the time of the formation of the Swiss Confederation in 1291, the larch at about two hundred years of age had attained a diameter of about thirty-two centimeters.

#### Game and the Forest.

##### *Editor of The Forester:*

I read in a recent issue of your journal that "fire lanes" are unanimously considered the most expedient prevention against the spread of conflagrations in forests. The construction and maintenance of these lanes naturally incurs more expense than the owners of woodland feel disposed to pay. In consequence of the lack of these lanes and proper supervision the pine barren region is rapidly becoming a veritable *terra damnata*. In places it is little better than a desert, although at one time productive and prosperous. This devastation is due solely to fire, which in turn is due to the carelessness and maliciousness of mankind.

This region is of special interest to two classes of people—foresters and sportsmen. It is of special interest to the first because it has been and is still able to produce valuable timber. It is in fact fit for no other purpose. It is of interest to the sportsman because it is the home of many kinds of game. It is only by a combination of these interests that these forests can be protected as long as the land remains in the hands of individuals and not the State. These two interests are interdependent. The value of the sportsman in this combination must not be underrated. Foresters and others must not forget that the preservation of the forest and game go hand in hand, and that even in Europe the royal hunters have to be thanked for many famous forests. Even to-day in Europe hunting and forestry are linked closely together, and often large revenues are obtained by selling the hunting right on certain tracts to wealthy individuals. In former times, in fact, the forest was valued more for that purpose than for wood. When the population increased and fuel and lumber became scarce and costly, a conservative forestry policy became of course necessary. I would like to emphasize the fact in this connection that by enlisting the aid of rich sportsmen in this work the forests will be preserved until public opinion has had time to change and the cultivation of wood becomes profitable. I

would like to suggest also to the owners of large tracts of land that they employ well-educated, skillful foresters instead of ordinary managers who may possess business tact, but who are wholly incompetent to care for the forest so that it will yield an income constantly and at the same time improve in quality.

The pine region of New Jersey is excellent for the purpose of rearing game. It is near large cities, and its climate is such that a great variety of wild animals will thrive there if properly protected. The pinnated grouse or prairie chicken will find a suitable home in the region known as the East and West Plains. There are other places in the neighborhood well fitted for the English pheasant, partridge, wild turkey and guinea fowls. Notwithstanding the severe fires which destroy both game and food supply, thirty-eight deer were killed in Southern New Jersey in one week last year, besides thousands of quail and grouse. Were it not for the dense damp swamps in which these animals can find water, food and shelter in summer they would have been exterminated long ago, not by the gun, but by fire, the most destructive of all natural agencies. There are many fresh and salt marshes, swamps, ponds and bays for water fowl of all kinds. In fact, the barrens of Southern New Jersey can be converted at the same time into a paradise for sportsmen and a productive forest. When I say "sportsmen" I refer only to those gentlemen who are willing to adhere to rules and regulations for the perpetuation and increase of the game which affords him sport. The man who disregards these fundamental principles deserves to be deprived of the privilege of hunting for all time.

So in order to prevent these great conflagrations, protect the forest and game, and to revive the industries of this neglected region, I suggest that a club be formed, consisting of at least a thousand wealthy members, for the purpose of leasing for a long term of years the exclusive shooting privilege on many thousand acres of this barren land. The owners of this land ought to rent or sell at a low figure. This organization should con-

struct and maintain fire lanes, employ wardens, who should be foresters, and construct houses here and there for their convenience. The sections can be easily connected by telephone, so that a large force may assemble on short notice to the scene of the fire, and in that way these conflagrations can be materially reduced if not prevented.

With a membership of five hundred, each paying fifty dollars initiation fee and fifty dollars annually thereafter, much could be done toward protection and improvement of the pine land of New Jersey. In twenty-five years the growth of timber, if it is properly protected, will more than pay the outlay. There are, of course, difficulties in the way, but these will vanish when a club is formed with money enough to complete its project.

PERCY OHL.

PLAINFIELD, Oct. 1, 1896.

#### For Forest Protection.

The following resolution was submitted by the ladies of New Jersey, and adopted by the General Federation of Women's Clubs, at Louisville, May 29, 1896:

*Resolved that*

"WHEREAS, There is nothing of more paramount importance to the welfare of State and Nation than the preservation and economic development of our natural resources; and

"WHEREAS, It is everywhere apparent that the wicked and wasteful destruction of our forest cover is a direct robbery of these resources, and should be checked by every measure, both of private endeavor and legislative enactment; and

"WHEREAS, It is self evident that if these threatening conditions are realized and public sentiment aroused an incalculable benefit will be conferred on our entire nation; be it

*Resolved, That as General Federation of Women's Clubs, and as individual clubs, as far as possible, we pledge ourselves to take up the study of forest conditions and resources, and to further the highest interests of our several States in these respects."*

## The Forest in Relation to the Farm.\*

BY JOHN GIFFORD.

An advanced state of agriculture demands a conservative forestry system. They are to a certain extent inter-dependent. As one develops the other should develop accordingly. The forest must be regarded as a crop which must be planted, cared for and gathered as other crops. Every new country passes through a period of recklessness. Agriculture is just beginning to reach a stage where science, and not guesswork, is the basis of the simplest operation. We have entered an age where it is judicious, if not always necessary, to husband our resources. The forest resource is still, however, treated in a lavish manner. A scarcity of forest products and an increase in population, in spite of low transportation rates for long distances, will soon render a conservative policy necessary, regardless of the beneficial effects of the forest on the community in many other ways.

There are three kinds of forest-owners : (1) The farmers with their wood-lots ; (2) speculators and land-swindlers, who own large tracts of land simply for the purpose of reaping a profit without improving its condition, and (3) those who own land for the purpose of developing its resources, such as lumbermen and manufacturers.

In order to bring about a change in the treatment of our forest lands—that is, to make them more productive of useful materials—the co-operation of the first and third classes is necessary. Generally speaking, these men know that our forest resource is being recklessly destroyed ; they know also that the reckless destruction of useful property is wasteful. All do not know, however, that fires can and have been prevented or reduced to a minimum at a cost small in proportion to the losses which have been inflicted by this, the most destructive of all agencies. The writer has no hesitation in saying that were it not for fires the forest would grow rapidly enough to keep all the choppers

and mills of New Jersey at present in operation constantly. In other words, provided fires are prevented, our mills could do little more than cut the annual increment.

Forestry is misunderstood throughout this country. Before endeavoring to show the relation of the forest to the farm I shall define the term, and I can do it in no quicker and better way than by quoting from an editorial in a recent issue of *Garden and Forest* :

"Forestry is the art of maintaining and perpetuating forests. It is successful in proportion as the forest yields the largest annual income in perpetuity. \* \* \* Forestry as a branch of scientific agriculture is less than three centuries old, although in Japan, sylviculture, in a restricted sense, has been practiced for more than a thousand years. Its importance, however, to the welfare of the community is considered so great by the most enlightened nations that men of first-rate ability have found reward in bringing this art, in a comparatively short time, to its present standing as almost an exact science. In Germany and France no other branch of agriculture is more carefully studied and practiced, and, in the long run—that is, in periods of centuries—no other pays a larger return upon the invested capital. \* \* \* The wasted forest can be rendered productive again, and it is within the possibilities of science not only to do this, but to make any forest more productive and, therefore, of more value than it could have been without the intervention of forestry. Just as the gardener makes the fruit tree more productive of fruit, the care of the forester makes the timber tree more productive of timber."

In this editorial sylviculture is properly considered a branch of agriculture, and a forester is little more than an expert and scientific farmer, who has devoted his time and attention to one class of crops, namely, those yielded by the forest. When a farmer grows corn he reaps the increase in a few months ; when a forest is planted, the increase is stored in the tree, and perhaps is not available for half a century. When a forest is once established, however, if properly regulated it will yield an increment forever, while the principal remains the same, if not actually improved by the system. The forest, like the Arabian date groves, should descend as an heirloom from generation to generation, while the increment is the interest which is due the person who holds the principal in keeping. The

\* From the twenty-third annual report of the State Board of Agriculture.



main point in this connection is that all regulations in relation to the forest must have *permanency* in view.

In early times the settlers cleared the land which was located in desirable positions—along stage routes and rivers. They often selected land which could be cleared and worked with the least effort. At that time, owing to the preponderance of wood, they regarded the forest more in the light of an enemy than a friend. Many of these farms have been abandoned, and pine forests mark the sites of their fallow fields, while near at hand, perhaps, the present generation is clearing the rich swamp lands for berries and other crops. Gradually the forest, by a natural process, is being relegated to the lands which are poorest in every way, and which for many reasons are unfit for profitable agriculture. This is the proper practice, and were these waste lands properly forested they would yield enough wood and other forest products to supply more than twice the inhabitants of the more densely inhabited parts of this State.

New Jersey, although in places thickly populated and in others carefully cultivated, possesses broad areas of sterile land which, in appearance, are little superior to deserts in spite of nearness to large cities. These areas, instead of being forested and protected, are devastated annually by fire and reckless choppers, and the great work which nature is doing in endeavoring to improve the soil, shield mankind from winds, droughts and a host of destructive agencies, is more than counterbalanced by his recklessness, maliciousness and greed.

In the southern part of the State are the sparsely inhabited pine-barrens where one may travel for several miles without seeing the face of a human being. In North Jersey there are many hilltops, ridges and rocky ledges. The most stubborn man on earth would be willing to see such land used for the permanent occupation of forest, and since the proper improvement of such lands is at present beyond the power of individuals, they should be owned, forested and protected by the State. The advantages which

would accrue to the State would be manifold and far-reaching.

The most important influence of the forest is in furnishing materials for which experimenters are finding new uses every day. Were the forests on the barrens allowed to grow, they would furnish employment to many men and mills, and, in the course of time, would yield a large revenue. Fires are driving people out of the country, preventing others from coming, and rendering it unfit for those who may be forced to live there.

The forest gradually improves the condition of the soil. If it had no other beneficial influence it would be worthy of protection for this reason alone. The richness of our virgin soils is due mainly to the detritus of the forest. There is no better fertilizer than the ashes of hardwood trees, and these ashes are simply the materials which the roots of the tree gather from the deeper layers of the soil and deposit every year on the surface in the form of leaves. The leaves are richer in inorganic materials than the wood. The rich black humus of our swamps consists of the semi-decayed leaves, limbs and undergrowth of the forest. In the streets of almost every American town tons of these leaves are burned and wasted. It is the decomposition of this organic matter, through the agency of micro-organisms, which furnishes nitrates to the soil which are so essential to the growth of all plants.

In rocky regions the organic acids in the rootlets of trees dissolve certain parts of the rock, causing it to disintegrate to form soil. The solvent action of water charged with carbonic acid, which results from the decay of vegetable matter, is well known. The rock in crumbling forms soils and feeds the vegetation which covers it with the soluble inorganic substances resulting from its disintegration. Step by step, beginning with the humblest lichens and mosses, a soil forms and increases in depth until a forest, with a layer of rich, black humus on its floor covers what was once a bare, barren rock. Visit coral islands and you will see how the roots of trees have honeycombed the rock.

Every farmer recognizes the influence

of clover on the soil. It adds so much to its richness that it is planted for that purpose alone. Through the agency of peculiar living organisms on the roots of the clover, the tubercles in which they are located being visible to the naked eye, a larger amount of nitrogen is available for the plant. This peculiar process is in progress during the period of growth of the majority of plants belonging to the bean, pulse or clover family, and, perhaps, on plants of other families. In this region there are few trees belonging to the pulse family, although in the tropics they are common. The black locust is the principal tree of that family which is common in this State. This tree grows on extremely dry sandy soil with remarkable rapidity. The wood is hard and durable, and the ash is as rich, if not richer, than that of any other tree. "Sylviculturally," says Brown and Nisbet in *THE FORESTER*, "the locust occupies a paradoxical position, like that which the variety of pulse called lupine occupies agriculturally; for, whilst analyses of its foliage and stem show that it withdraws from the soil large amounts of mineral salts and of the water in which they are held in solution, yet it apparently is content even with occupying poor sandy soils." This authority states that the locust improves these sterile regions in the same way as does the clover plant; that is, through the agency of bacteroids on its extensive horizontal root system.

The next great influence of the forest is in breaking the force of the wind. It protects crops and prevents soils from shifting. The wind parches the soil and picks up and carries away the light, fine grains, leaving the coarse, undesirable particles. The shifting sands cut and bury crops.

The roots of the forest keep the soil loose and prevent the rain from leaching and compacting it. It prevents the sun from evaporating the moisture on the surface. The forest retains the snow in winter; it prevents the water from rushing in a flood to the sea; it holds the soil in place, preventing erosion.

The erosive action of water is acknowledged by geologists to be one of the most

important agencies in changing the nature of the surface of the earth. Gullies are everywhere, and in our western country gulches and huge canyons are the result of this agency. It is visible by every roadside and in every field. On many farms, after a rain, one can see potsherds and small shells resting on little pyramids of earth fully one-half an inch above the surface of the soil. Surely that much of the earth has been washed away or compacted to that extent. The forest is the great agent in retarding the flow of water, and preventing the soil from washing into the beds of the streams and rivers. An account of the beneficial influences of the forest would fill many pages. The forest no doubt has some influence on the local climate and rainfall, but there is little reason for believing that the general climate is in any way changed by the presence of forests.

A forest renders swampy regions less malarial and adds more beauty to the landscape than any other feature. Were the mountains and pine regions of New Jersey covered with well-cared-for forests and traversed by good roads, the income from tourists would amount to many dollars. But throughout this State there is little left which is worthy the name of forest. Where were once beautiful, attractive pine woods are now embers and stump holes, and the passenger in passing through the pine barrens to the seashore sees little but desolation.

No matter how perfect in every other particular, a farm is incomplete without a wood-lot. This wood-lot deserves attention, since it may become the most valuable part of the farm. It should occupy the most sterile part of the farm—a place which is too sandy or damp or rocky for the cultivation of other crops—the better the land, however, the better the wood crop. The following are a few hints in relation to the care of the wood-lot:

(1) Keep out fire. This is always the first and most important step toward the improvement of woodland. (2) Keep out cattle. Cattle are very destructive to young trees. (3) Remove all decaying wood, but do not disturb the leaves and

undergrowth on the surface. Decaying wood breeds destructive insects, and living undergrowth is essential in that it protects the surface of the soil from the action of sun, wind and rain. (4) Do not always cut the best unless it is ripe or ready to cut. Do not use a fine half-grown tree for fire wood when there are poorer ones which will answer the purpose. Cut the forest weeds, that is, the undesirable and less useful kinds, and encourage the valuable species to grow. (5) When you plant, plant useful kinds, such as the black locust, black walnut, white pine, white cedar, white oak, chestnut and yellow pine (*Pinus echinata*).

By using a little care with the axe the wood-lot will improve, and at the same time yield an income by supplying wood for fuel, with now and then a stick for other purposes.

In speaking of trees for planting, you will notice, no doubt, that I have not mentioned the red cedar, which, although excellent for posts and common around farms, is objectionable for one very good reason. This is one of the most widely distributed trees in this country. It is found in the swamps of the South and in dry fields and on rocky hillsides in the North. Its seeds are carried by birds and dropped along fences. It breeds a fungus which is destructive to apple and quince trees. All have noticed the brown balls on the cedar. These contain the teleutospores, or winter spores, of this disease. These spores, during moist times in the spring, germinate, so that the cedar ball becomes covered with an orange-colored, gelatinous mass. On the ends of these gelatinous filaments fine spores are formed which blow over on to the leaves of the apple, causing a disease which is familiar to almost every apple grower. The name of this fungus is *Gymnosporangium macropus*. One authority on the subject writes: "I have not urged the cutting down of the cedars only when the trouble is the worst. Some people prefer to have fewer apples than lose their cedars." Another writes: "It seems to me that it would be objectionable to plant largely of red cedars in the neighborhood of apple and quince plantations." Since these

letters are from two of the best authorities in the United States on the subject, I hesitate to recommend the red cedar, although I would rather have "fewer apples than lose the cedars."

I have yet a few words in conclusion, in reference to the awful fires which were common throughout the State during the drought of 1895. The following is a summary of the information collected concerning fires by the geological survey for Ocean, Atlantic and half of Burlington counties:

First fire occurred March 18th.

Last fire occurred October 22d.

The writer observed forty-nine fires. Several were burning at the same time, and one lasted for twenty-six days. There were hundreds of small fires, which were extinguished without doing damage.

March.	}	Three caused by sparks or coals from locomotives.
		One set by a careless tramp.
		One, cause not known.
		One, cause not known.
		One, incendiary.
April.	}	One, escaped from haymen while burning meadows.
		Six caused by sparks from locomotives.
		One, careless workman burning brush.
May.	}	Two, careless smokers.
		One, incendiary.
		One, cause not known.
August.	}	One, escaped while burning a safety-strip in order to protect a cranberry bog from fire.
		Thirteen, sparks from locomotives.
		One, incendiary.
September.	}	Three, carelessly or purposely set by berry-pickers.
		One, cause unknown.
		Two, carelessly set by feeble-minded persons.
October.	}	Three, carelessly set while burning brush.
		One, set carelessly or maliciously.
		One, set by an Italian back firing in the wrong place.
October.	}	One, set by careless smokers.
		One, set by Italians accidentally while cooking in the woods.
		Two, sparks from locomotives.
October.	}	One, incendiary.

One was set by lightning, but no damage was done.

These fires burned at least 60,000 acres, including corded wood, houses, fences, 100 acres of cranberry bogs, sawmill, &c. The damage for this area alone amounts to \$600,000. Owing to the fact that Ocean county was severely burnt over in 1894, there were few fires in 1895, so that most of this damage was done in Atlantic county. Cape May county suffered from fire during the past season. Although a small county, 20,000 acres is a low esti-

mate of the area burned over. It burned deep into the swamps, burning rich black earth which had been centuries in forming. The roots of the trees were burned off so that they tumbled over into large heaps, forming a nidus for pestiferous insects and future fires. The burned regions look like the surface of the moon or a worn-out world. There are miles of blackness without a twig of green, and where the only indications that a forest once grew there are charred sticks and deep stump-holes. The soil has been ruined, seeds have been burnt, and this and many generations will be dead and buried before the forest grows again unless these conflagrations are prevented.

#### The Exploitation of Waste Land in Holland.

Only a part of Holland is below the level of the sea. It is not all wet earth between water and water. By years of toil a large area of fertile land has been reclaimed. Huge dykes keep out the sea and hold the turbulent Lek and Waal and Maas in check. Polders, or shallow lagoons, have been turned into truck patches and pasture lands, and branches of the rivers, like the bayous of the Mississippi, are now important avenues of trade as well as large drain ditches into which the excess water is pumped. What was once the bottom of the sea is now in meadows and gardens. This region is intersected by many sluggish canals on which ply hundreds of picturesque boats. Behind the banks are low, cozy farm houses, the roofs of which are thatched with reeds. In Holland a thirty acre farm is considered large. One is impressed with the fact that a small area, scientifically, economically and neatly cultivated is, in the end, more profitable than a large neglected farm of the American type. In the lowlands, trees are not plentiful. The houses are usually surrounded by trellised elms and lindens, which are often trimmed in a great variety of peculiar ways. Willows are abundant around almost every dwelling. Here, too, are many picturesque windmills, which are used for pumping the water out of the fields, for grinding grain, sawing lumber, and other purposes. Huge stacks of hay,

heavy crops, and hundreds of thousands of sleek, black and white cows indicate that, in spite of the difficulties under which he labors, the Dutch farmer is prosperous. Everything is clean, and an American is impressed with the fact that nothing is wasted. Reeds along the rivers are used for thatching, small sticks for fuel and brooms; every scrap of garbage and almost every leaf is composted for fertilizer; the twigs of the willow (the "Cinderella of trees") have hundreds of uses; dogs are worked; and such plants as the portulaca, which, in America, are weeds, when not fit for food are used for some other purpose, and so on one could mention a thousand little things in which the Dutch economize. Little sticks no longer than lead pencils are used for fuel, while in America, "log rollings" are still fresh in the memory of many men; forest fires are common, and a single log is cut from a tree and the rest is left to rot in the woods, to breed pestiferous insects or furnish fuel for forest fires. In Holland every stick is sorted; the coppice oak is carefully peeled for its bark, which is used for tanning purposes; and small pine poles, the like of which are thrown away in America, are split for fence and trellis construction; and plant props are sawn into slats for the purpose of binding moss litter in bales. Holland contains 3,600,000 hectares of land, with a population of 4,000,000 people. Much of the wealth of this little country comes from the Colonial possessions, which are many times larger and much more populous.

Like southern New Jersey, Holland has its upland, its meadows and its dunes. The most fertile land in Holland corresponds to the salt marshes; the "polders" to the salt ponds; the dunes along the North Sea to the dunes along the Jersey shore, and the large area of upland, or heath, to the pine lands and savannahs of the southern interior. In spite of the fact that the Dutch are thinking of reclaiming the Zuyder Zee, strange and paradoxical as it may seem, there are still in Holland from four to five hundred thousand hectares of waste land, which consists of heath, moorland, dunes and morass. As with growing tulips, the



Dutch have had a mania for wresting land from the sea and for living below its level in the midst of mud and water while there are large areas—for instance in the region of "De Peel" (Brabant)—which are still idle, although experiment shows that they can be made productive. No doubt in this region bee culture would be profitable, and the fruit crop larger in consequence, since the Germans bring their bees in hundreds of straw hives to pasture upon the flowers which grow there. For this privilege they pay a rental of one penny per hive.

There is a Society in Holland called the "Nederlandische Heide Matschapij," with objects similar to those of the New Jersey Forestry Association. Its official organ is a bi-monthly journal, similar to the FORESTER. It is encouraging to those interested in similar Societies in America to know that the "Heide Matschapij" and a similar Society in Denmark, after which it was modelled, have been successful in many respects. It is also gratifying to learn that even in Europe a great deal of what has been accomplished is due to societies similar to the State Associations of the United States. This Society was founded in 1888. Its objects are to promote the exploitation of the dunes, heaths, and other desert places; to give advice; to form nurseries, and sell trees at cost price; to educate the people in the principles of forestry by distributing literature and by delivering lectures, and to encourage the Government to improve the waste land which it owns. It has a membership of 2,000. Every member pays two guilders annually, but there are many honorary members and patrons who pay much larger sums for its support. This Association has already accomplished a very great deal. It has induced the Government to continue the work of foresting the dunes, for which 30,000 guilders have been already appropriated for experimental purposes. This work is under the direction of the Society. Two nurseries have been formed, in which many seedlings for dune planting are grown. This Association has induced individuals to improve their waste lands, and con-

templates buying and improving heath land for example sake. Under the direction of Mr. H. J. Lovink, who is an able and enthusiastic forester, the Heide Matschapij is destined to be instrumental in converting every acre of heath and dune in Holland into productive forest and farm land.

In Europe, as in America, it is evident that laws relating to the forest are of little use unless the people are interested. Even in Europe it is mainly a question of education.

The Dutch dunes are similar to those of New Jersey. Unless the soil is covered, it is shifted by wind and wave. Seventeen hundred hectares of land in the region of the town of Bergen is owned by the Government. This is very much like the dune land near Avalon on the Jersey shore. There are residences surrounded with large trees in the lee of the Dutch dunes, but everything has been planted, even the famous forest between the Hague and Scheveningen—the Atlantic City of Holland. It will cost the Government at least 200,000 guilders to plant its dune-lands in forest. Many private holders in this region are not in favor of this work. Many prefer to see it in its unproductive state, mainly for hunting purposes, however, since rabbits are abundant there. The extermination of the rabbits, owing to their destructiveness, have been decreed, and two thousand have been killed already on that part of the dunes belonging to the Government.

Thirty years ago, experiments were begun by the famous geologist, Staring, for the planting of the dunes for the Government. The work was frowned upon and discontinued, but the pines which he planted still remain.

A fresh impetus was given to this work by the Heide Matschapij, and indications are that the work will continue. In foresting these dunes it is not necessary to plant sedge or other herbage to hold the sand in place. It is considered not only useless, but detrimental. The ground is covered with light rubbish until the young conifers are well established. A voracious insect (*Cneorrihnus plagiatus*) lives on the holm, or dune sedge. Hens



are very useful in killing these insects. They are kept on the dunes in large quantities, and as early as three o'clock in the morning they may be seen actively at work capturing these insects.

The Austrian pine seems best suited to the Dutch dunes. In Denmark it becomes diseased, so *Pinus montana* is planted in its place. Douglas spruce and *Picea alba* grow well also, but the most rapid grower of all is the *Pinus Banksiana*, which they have not planted in Holland because of the expensiveness of the seeds. The climate is too severe for *Pinus maritima*, which is used by the French, although it seemed quite healthy in a garden at Helenaveen, in the province of Limburg in South Holland. It is quite likely that the maritime pine will withstand the climate of southern New Jersey, although there is little need of introducing new species in America.

The dunes are quite useful in serving as dykes to keep out the sea and in supplying good water to Amsterdam and other cities in the neighborhood; in fact the very existence of the lowlands of Holland is dependent upon them.

Connect the long line of dunes along the Jersey shore with huge dykes with strong gates, turn its thoroughfares and rivers into canals, pump the water out of its marshes and you will have another Holland. A Dutchman ought to feel at home there, for in Holland there are mosquitoes which are just as musical and active as those of New Jersey. Such an undertaking would be foolish, however, since there are hundreds of acres of land available which is above the level of the sea, and the marshes already pay a good income in yielding salt hay and black grass. In Louisiana, however, the American people have vied with the Dutch in the construction of huge levees for the reclamation of the rich alluvial lands of the Mississippi delta. When one considers the size and population of Europe, its age and the large area which is still waste land, he returns to America encouraged and with a higher appreciation of the possibilities of his country and what has been already accomplished.

In the eastern and southern parts of

Holland there are vast stretches of rolling heath lands. This heath is a continuation of the Lüneberger Heide in Hannover, through Schleswig-Holstein and Denmark to near the Zuyder Zee in Holland. The soil is sand and gravel, mainly glacial drift, in which may be seen irregular ice-worn pieces of rock from the Scandinavian peninsula. There are reasons for believing that at one time this region was in part forested. The names of the places in old Dutch often mean "forest," or "wood," and Mr. J. H. Schober, the pioneer of heath planting in Holland, found part of the trunk of a large oak buried deep in the ground on his plantation at Schövenhorst. The region was probably despoiled in many ways. A few sheep live upon the scanty herbage, and as soon as a little humus forms on the surface it is removed by the peasants to mix with manure. The beating force of winds and rains has compacted and leached the surface soil. Low heather (*Erica communis*) and crisp lichens cover the ground, reminding one of the sterile fields in southern New Jersey. It is even more barren than the fire-swept plains of Ocean County. With work, this whole heath can be reclaimed. The huge experiment which Mr. Schober has had the patience and patriotism to begin proves that trees will grow there. A careful working and a little enrichment of the soil are all that are needed at first.

When Mr. Schober began his plantation at Putten (in Gelderland) it was all a desert heath. This work was begun forty years ago and still continues. Conifers from all parts of the world are growing there luxuriantly. The results of these experiments have not been published, in fact the experiments will not be complete for years to come. They show at least, however, that a great variety of conifers will grow on the heathlands of Holland, and that certain species are, of course, much better adapted to the soil and climate than others. It will require many years of patient toil to determine the best species. Many tests must be made before conclusions are warranted. Mr. Schober has planted also large quantities of the common species

(*Pinus sylvestris*) from which he receives a revenue. This wood is cut and carefully sorted and the poles are shipped to the Belgian mines. What surprises one the most in this remarkable plantation is to see Rocky and Atlas Mountain species thriving in the heathland of Holland. The most beautiful trees in this large pinetum are *Abies nobilis* and *Cedrus Atlantica*. The government should endeavor to buy this interesting plantation and continue the experiments which have been so successfully begun, and Mr. Schober should be amply rewarded for his extraordinary patience and patriotism.

It is a very great question whether it is profitable to introduce species from foreign parts for planting. Certainly in a territory like New Jersey our native species fulfill all requirements. All that is needed in America is the prevention of fires and the judicious use of the axe. In a country where land is so cheap and plentiful, and where natural regeneration is so prompt and rapid, planting is useless expense.

A very great deal of private planting has been done in Holland, and with very little encouragement from the Government. In the southern part there are large areas in Scotch pine and coppice oak. The willow has been planted in immense quantities along the Lek, the Rhine, the Maas and the Waal.

In the sandy heath regions much of the soil has been improved by planting *Lupinus lutea*. This beautiful plant may be useful in America as a green manure, since it seems to flourish on very sandy soil.

The American locust (*Robinia Pseudacacia*) is common in Europe, since it grows well on poor soils, although there is a slight prejudice against it. It is the custom to plant it along railroad embankments. It is also a favorite shade tree in many German cities. When properly trimmed it has no equal for the purpose. It is not infested by insects in Europe, although in France it harbors the mistletoe. If all the locusts along the railroads in Europe are allowed to mature they will reap a supply of excel-

lent timber for construction purposes. The wild cherry (*Prunus serotina*) seems to thrive on the heath lands. The most beautiful trees in Holland are beeches. They are usually planted with the light demanding kinds, such as birches and tamaracks.

I have yet to refer to another very interesting territory in the Province of Limburg, called "De Peel." In this region there are great masses of peat. This material is several feet in thickness, and covers a large area of ground. The abundance of this material has reduced the demand for wood, although when transported into the large cities it costs as much as coal. Huge masses of it, cut in small blocks for fuel, may be seen in several parts of Holland. It is most abundant in the region called "De Peel," between the village of Helenaveen and a new settlement known as "Amerika," which has the appearance of our wild west.

Being of a later formation the top layers of this peat are coarser and lighter in color. The lower layers are used for fuel. On the top of this spongy bed heather, grasses, sedges, sphagnum and other plants are growing. At Helenaveen the upper layers of this peat are shipped by a canal to a mill where the *moss litter* is separated from the *moss fibre*. The mill is built on a boat and is moved up and down the canal to suit, and when cold weather comes it is floated to the nearest railroad station and the peat is drawn to the mill on sleds. In other words, in summer they take the mill to the peat; in winter they take the peat to the mill.

The moss litter is baled and shipped long distances to be used as bedding in stables. The moss fibre, which seems to be nothing more than the semi-decayed leaves of grasses and sedges, carefully cleansed, becomes a soft, silky fibre, which is useful for many purposes. It is woven into rugs and tapestries and because of its peculiar antiseptic properties is fit for many other purposes. For this reason also the moss litter forms a healthy bedding for cattle and horses, and makes also a fine grade of manure. The antiseptic nature of this peat is even well

known to the peasants in certain peat regions, where they bury perishable foods in this material to preserve them. The bodies of animals in the course of time turn into adipocere when buried in peat.

After the top layers of peat have been removed and sand is spread over the surface it becomes very fertile farm land. The soil is but slightly effected by an excess or dearth of rain when underlain with peat. The potato flourishes in this peculiar soil. It reminds one of the tamarack bottoms of Michigan, where onions and celery are so successfully grown. To one interested in such things it is worth coming to Europe to see.

We were very fortunate in meeting Mr. J. C. Van Blocquerij, a very cultured and hospitable Hollander, who speaks English as well as an Englishman, and who showed us everything except a machine or two which he very wisely keeps out of sight. He is manager of the Heleneveen Co., and the presiding genius of the settlement. He remarked that charred tree stumps had been found under the peat, and that in the bogs of Friesland and Drenthe trees are buried all lying in the same direction, as though leveled by a gale.

I have yet to mention that the Royal Agricultural College is at Wageningen. Attached to this institution is a School of Forestry, which is mainly for the purpose of fitting young men for service in the endless forests of the colonies, where sixty to eighty per cent. of the graduates find employment. The work of instruction is under the direction of Mr. A. H. Berkhout, formerly Oberforster in Java, who is the only forester in Holland paid by the Government.

In conclusion I have yet to mention the Colonial Museum in Haarlem, under the direction of Mr. William Van Eden. It contains an excellent collection of products from the Dutch possessions.

We looked almost in vain for the effects of fire in the planted forests of Holland, in spite of the fact that the peasants often burn the heath to improve the pasture for their sheep. We found two small patches of young pine trees which had been scorched.

J. G.

#### Jersey Farming and the Future.

From the Newark Advertiser.

Ever since the war there has been a steady movement of population from the rural sections to the towns and cities. Farmers' sons and daughters are no longer content to take up the occupations of their fathers, and many of them, as soon as they are of an age to leave the parental roof, seek homes and occupations in the cities. The labor which the farm loses by these desertions is ill supplied by a poor class of immigrants, or by such tramp labor as the farmer can pick up on the highway. In the rural sections of New Jersey the conditions as indicated have long been apparent. In many sections the population has remained stationery or dwindled, and there has been a steady decline in farm values. Farms that in 1866 were worth \$10,000 to \$15,000 represent to the buyer now no more than \$5,000 to \$8,000.

But there has begun from the cities, a movement to the suburbs and rural districts that is as marked as that of country young people to the town, and it seems to be the beginning of a new era of farm life that promises immense advantages to our State, situated as it is between two of the greatest cities of the United States.

Improved land in New Jersey is already higher in value than in any other State of the Union. Last year the total product of our farmers and dairymen brought \$28,997,349, representing an average value per acre of improved land of \$14.51. This improved land constituted 75.1 per cent. of the total area of the State, including mountain, salt meadow, pine barrens and sand dunes. The total average value per farm in New Jersey is \$5,918, and there are 30,828 farms, of which 22,442 are worked by their owners.

Now, the largely reduced values of farm lands since the war are bound to be the best factor in the restoration of the farming industry. The reduced value makes the plant cost only one-half of its former price, which is a great saving of capital to a purchaser now. Then, again, farm machinery and implements are much cheaper than they were twenty or thirty years ago. Horses which then brought

good prices can now be bought cheaply, and other farm animals are much reduced in price. As very few are raised for sale in New Jersey, this is a great advantage to our farmers. Electricity is taking the trolley into the rural districts, too, and will soon relieve the farmers of the exorbitant freight charges of the railroads, and give him convenient communication with the city.

The present movement of population from city to country is largely one of preference, but the advantages of farming as a business occupation, which we have pointed out, will appeal to a large class of people of small means and ambition to earn a competency. They will see in farming, especially in New Jersey, opportunities for a comfortable living and the care and education of their children that they could never have in the crowded city, and they will eagerly embrace them. There is a hopeful future for the farming interests of New Jersey.

#### Forestry Practice at Mahwah, N. J.

The woodlands of Mountain-Side Farm, at Mahwah, N. J., the property of Mr. Theodore A. Havemeyer, were placed under a regular system of forest management on June 1, 1895.

It should be said that the owner considers the forestry work pursued on his estate strictly from a business point of view.

The forest, some one thousand nine hundred acres, is composed principally of deciduous trees, as oak (white, black, red, pin, chestnut and scarlet oaks), hickory (shellbark, bitternut and mockernut), maple, beech, occasionally white ash, tulip tree, elm, buttonwood, common locust, sour and sweet gum, white birch and red cedar.

Some eight or ten years ago the woodlands were bought from small farmers, and when the writer was placed in charge the forest condition was deplorable.

At present thinnings and improvement cuttings are in full operation, performed by carefully trained woodmen and under the personal supervision of the forester.

The material taken out is sold as railroad ties and posts, at good prices, to a

nearby railroad company, and cord-wood will be shipped to New York, Paterson and Hackensack.

A nursery has been established to raise desirable and valuable trees, and plantations on a larger scale are planned. Ground, unfit for agriculture, is prepared for cultivation of willows, especially the valuable French and German kinds.—*F. R. Meier in Forest Leaves.*

ON Saturday, the 13th of July, 1895, about 3 p.m., local time, there occurred in the vicinity of New York city a series of severe wind storms, accompanied by rain, hail, thunder and lightning.

One of these storms struck the northern end of New York city, causing considerable damage to roofs, windows and trees. Another storm, or part of the former, devastated the village of Woodlawn, Long Island, N. Y., causing the death of two persons and injuring about twenty-five others. A third storm, probably the beginning of the series, laid waste the village of Cherry Hill, New Jersey.

Cherry Hill is a small village lying about two miles north of Hackensack, on the line of the New Jersey and New York Railroad, and about fourteen miles from New York city. The Hackensack River touches the northern boundary. This village is beautifully situated on level and gently rising ground, and extends in northerly and southerly directions. It contained about forty houses and had a population of about two hundred.

The storm which devastated this village had its origin in the vicinity of Lake Hopatcong, in the northern part of the State. It traveled southerly, then northerly, entering at the northwest about 2:45 p.m., with a dense black cloud, which rushed southeastward with great velocity, expanding and throwing out dirt-colored scouts, which whirled and tumbled violently. As the storm drew near a loud roar was heard, and the next instant the great destruction was wrought.

A tulip tree twenty-eight inches in diameter and fifty-five feet high, was broken off about eight feet above the ground, the splinters of which were three



EFFECTS OF THE CHERRY HILL, TORNADO ON TREES.

LOANED BY THE NEW JERSEY WEATHER SERVICE.

feet long. The accompanying illustration, for the loan of which we are indebted to the New Jersey Weather Service, shows the damage done by the storm to trees. Those in the picture

were maples, the largest of which was eighteen inches in diameter. This note is from the report of the New Jersey Weather Service, which describes in full the nature of this tornado.



#### Some Truths About Toadstools.

From early spring until nipping frost toadstools are plenty in woods and field. It has long been known that about twenty varieties of them are excellent eating, and that other species contain a deadly poison.

The books descriptive of toadstools are principally of foreign origin; and while exact and full in their detail of the botanic characteristics, they give but little information as to the edible and non-edible qualities of species common to this country; and that little, in many instances, wrong. This, because the writers have followed one another in the repetition of errors, rather than widen their experience at personal risk by testing the varieties to ascertain the truth about them.

Dr. Curtis, of North Carolina, published a list of one hundred and eleven species of toadstools which he found to be not only edible but excellent and wholesome food. His object in doing so was to draw the attention of the Confederate Army to the vast supply of sustenance going to waste, when food was so scarce and means of obtaining it scanty.

The writer has by personal experiment increased the list of edible fungi found in this country to four hundred and thirty-seven kinds, and confidently expects to add many more to it. The publication of descriptions of these edible species will, ultimately, be of great economic value; but, owing to the rashness of individuals in collecting and eating toadstools about which they now have either little or conceited knowledge, and consequent disastrous results therefrom, it is undoubtedly better at this time to familiarize the public with the appearance and characteristics of the poisonous species and the antidotes to their poison, than to lure them into danger by describing the edible species, the identification of which is easy to the expert or careful learner, but death-dealing to the careless and fool-hardy.

There is no known test which will detect poison in a toadstool or will decide that it is free from noxious qualities. Just as the hundreds of kinds of apples, tomatoes, potatoes are generally known

to the growers of them by their appearance, taste and smell, so must the kinds of toadstools be known to the collector. For eating, their condition must be as carefully considered.

The species of toadstools which are deadly in their effects when eaten, do not probably number over eight; but individuals of their species are plentiful. It is easier to know these eight species than to know the hundreds of other species, and by so doing, to eliminate them from respectable toadstool society.

The deadly poisonous toadstools all have stems and caps. The cap may be of almost any color, frequently dotted with warts or patches of dead skin. The stems are usually white or simply tinged. They are some times roughened with scales. On the underside of the caps are knife-like gills, radiating from the stem—which they do not quite reach—to the outer edge. These gills are white or very nearly so in all species excepting one, where they are of a rich light yellow. On the outside of these gills the spores or seeds are borne; by removing the cap from the stem (it separates easily) and laying it gills downward upon a sheet of paper—covering it with a tumbler to prevent it from drying—the gills will shed their spores in great numbers. It will be seen that they are white. (The spores of the common mushroom, obtained in the same way, are purplish black.)

Just below the cap, surrounding the stem, a thin kid-like veil or ring hangs. This on some species is permanent, on others it quickly disappears in all or part, but leaving a stain or trace which is always discernible. The stem varies in length and thickness according to species and manner of growth. It generally tapers from the bottom toward the top. At the bottom there is an enlargement which may be onion, egg or top shape. About this bulbous enlargement there is either a skin sheath, loose and ruptured at the upper edge and fast at the bottom, or ridges or remnants about the stem will show where one has been. This is called the sheath or volva. When young the entire plant is covered with this sheath; in its growth the sheath is ruptured and

portions of it remain adhering to the top of the cap as warts, scruff or scales.

These are the distinguishing marks of the *Amanita* family—the remnants of broken skin upon the top, the ring about the stem and the sheath at the bottom; but any or all of these marks may be so faint as to be unnoticeable at first sight, but the general appearance of the *Amanita* once learned will guide the collector to look for them.

The *Amanitæ* always grow upon the ground, and, as a rule, in the woods or under lawn trees. They are the most beautiful and attractive of the toadstool family. Some of them are remarkable for their majestic growth and fascinations of purity and color. Those found in the dense wood are generally of pure white, but others usually growing under fir trees are noted for their brilliant shade of crimson blended with orange. Most of them have a faint pole-cat smell, but not sufficient to be offensive. They cook easily, make an attractive looking dish, are tender and delicious. To a person eating a full meal of them, there is nothing to indicate their deadly nature; nor does the poison begin to show its effect under from eight to ten hours after partaking of it; then the symptoms develop rapidly, and unless heroically treated, death ensues in a few hours.

Extended articles upon the treatment and cure of *Amanitine* poison—the poisoning of the *Amanita*—have been published by the writer in *The Therapeutic Gazette* and in *The Medical and Surgical Reporter*.

If toadstools containing minor poisons have been eaten, uncomfortable symptoms show themselves as quickly as after eating any other substance disagreeing with the digestive apparatus—that is, in an hour or so; and these symptoms can be checked and conquered by the use of an emetic and drinking one or two glasses of whiskey and sweet oil, or sweet oil and vinegar, and it will be recognized by the early appearance of disagreeable symptoms that a deadly poison is not at work; but if, later, other symptoms appear, such as ashy pallor, thickening and dense coating of the tongue, a foul breath and violent retching, hypodermic injec-

tions of 1-60 of a grain of atropine must be immediately given, and continued until 1-20 of a grain is administered, or the effect of the poison is eradicated. In all cases where toadstool poisoning is suspected a physician should be summoned at once, and the case be carefully watched for the appearance of *Amanitine* poisoning. If possible, specimens of the toadstools eaten should be obtained and shown to the physician; and it is the duty of every physician to study and know the *Amanita* when he sees it.

It should be remembered that the breath of a man suffering from *Amanitine* poisoning is, in itself, deadly to those in the same room. Therefore, all possible ventilation should be given.

The *Amanitæ* are not poisonous to the skin, but the poison may be absorbed into the system by carrying them in the hand, especially in warm weather.

There is no difficulty whatever in distinguishing the *Amanita* from the edible mushroom. The edible mushroom has scruff on its top, and has a ring about its stem, but it has not a sheath at its base; its gills are never white, its spores are never white, and as it grows to maturity its gills darken from a light pink to a deep brownish black; but in the very early stages of its growth—in its button shape—the *Amanita* may very closely resemble the common mushroom and be mistaken by the unwary for it, but if its habitat in the woods (the common mushroom never grows in the woods), its surrounding sheath, its white gills, be taken into consideration, there is no possible excuse for a mistake in collecting the one for the other.

The writer, in the many articles upon toadstools which he has published, has never failed to describe the *Amanita* and caution readers against it. Unfortunately the Italians and the inhabitants of mining and manufacturing districts, of foreign descent, are not readers of this class of articles in the newspapers. They have a traditionary liking for mushrooms, and are, many of them, conceited enough in their limited knowledge of edible fungi to think they can eat of all kinds with impunity. It is among these classes of

persons that fatal toadstool poisoning usually occurs.

It is extremely unfortunate that those who have given years of study to toadstool eating, and who are aware of the immense amount of excellent food readily obtained, have to discourage persons from indulging in this food supply by displaying from the very first the danger signal; for there is no study more interesting, not one which more amply repays the student, not one of greater economic value, than that of the edible fungi.

There are many varieties of toadstool which are not edible because they are either too tough or slimy or otherwise unattractive as food. There are a few kinds which do not agree with the human system, because they contain substances which may be called minor poisons. There is a deep orange toadstool which grows in large tufts or bunches about stumps or the butts of trees, which is yellow throughout and has yellow gills extending far down the stem. This is the *Clitocybe illudens*. It contains an oxalate of potash. Small quantities of this toadstool can be eaten without unpleasant effects; but if a saucer full was to be devoured it would make some persons quite sick, but not dangerously so.

All toadstools which do not present in every way attractiveness, should be avoided, unless the collector has had the benefit of instruction from an experienced toadstool collector. Those who desire to pursue the study of toadstools should carefully read the articles of modern writers upon the subject; then carefully identify the species found with the descriptions given of them; then cautiously test each species by eating small quantities at first, and gradually increasing the quantity eaten until certainty of their edible qualities is established.

No one can go wrong in the puff-ball family, if eating is confined to fresh specimens, which are white inside and are not yellow or watery. The same can be said of the *Clavaria*—club shaped, coral shaped, or resembling the branched deer horn—provided they are not too tough or are decaying. The same can be said of many other groups—the little brown

headed fellows which grow in such dense clusters about trees and posts—frequently on lawns and other richly manured places—whose tops are brittle and look sometimes as if dusted with fine mica; all of the black gilled kinds, which are found growing from manured or rich places.

The *Russulas*—a very brittle gilled kind with short stems, no ring, white gills, and tops of green, brown, yellow, red, and various shades of purple—which grow in the woods and under trees in great quantities, are all wholesome and delicious. In the deadly family of the *Amanita*, itself, there are many species not only harmless, but luscious; yet no one should experiment with the *Amanita* or any toadstool having a ring and a bulbous base, without using extreme care. A very small piece of poisonous *Amanita* will produce extremely unpleasant effects. CHARLES McILVAINE.

France finds her Algerian cork-oaks a convenient and satisfactory source of direct revenue. According to a recent official bulletin, the department of Algiers contains 65,000 acres of cork trees in the hands of the Government. On these lands were realized during the last two years over 1,000 long tons of cork valued at about \$20,000. The total acreage of cork-oaks will be under exploitation by the year 1910, so the Bureau predicts, and, barring possible attacks of insects upon the trees, and reckoning on the price of cork remaining the same, the trees will by that time yield an annual revenue of \$35,000. N. W.

European foresters generally fail to appreciate the advantages of the American axe. They prefer to cling to the clumsy flat sided native instrument with its large straight handle. Many of the specimens exhibited in Europe as American axes are poor examples. There is a great choice amongst American axes and every professional chopper is very particular in having an axe of just the proper weight and shape, with a handle of the proper length and curve and "hung" in just the proper way.

**Nitragin: Inoculation of the Soil.\***

C. K. Aikman, in the Contemporary Review, London (New York: L. Scott Pub. Co.). Condensed for Public Opinion.

The object of this paper is to bring before the readers of this *Review* the latest application, in the domain of agriculture, of the great principle of inoculation, and which, in many respects, is of a more striking nature than anything yet accomplished by this line of research. It consists of the inoculation of the soil with pure cultures of bacteria for the purpose of promoting plant-growth. Some conception of its importance may be afforded by the statement that it offers a practical solution of the great problem of how to utilize for vegetation the boundless stores in the air of one of the most important of all plant-foods—viz., nitrogen—a problem which, we may add, has long exercised the minds of the plant physiologist and agricultural chemist. It is only a few months ago since an announcement was made to the German Agricultural Society that certain highly interesting experiments carried out by Professor Nobbe, of Tharandt, in Saxony, a well-known and distinguished authority on plant physiology, had culminated in the production, on a commercial scale, of cultures of bacteria for use in agriculture; and that arrangements had been made with one of the largest chemical manufacturing factories in Germany—the very same, indeed, which has already undertaken to supply the medical world with the antitoxic serum for use in the treatment of diphtheritic cases—to supply these cultures to any who might desire to use them. To these cultures the title *nitragin* has been given; and at the present moment many experimental trials are being either arranged for, or are in process of being carried out, with a view to test its efficacy.

It is now a number of years ago since Pasteur showed that the process of the decay or putrefaction of organic matter, constantly going on on the earth's sur-

face, was due to the action of micro-organic life. Subsequent research has demonstrated that the soil of our fields is teeming with bacteria, which, according to some recent experiments, may be present to the extent of *forty-five millions* per gramme (the 1·28th part of an ounce) of soil; and that these bacteria are largely instrumental in conducting to the successful growth of vegetation, by preparing, in forms suitable for assimilation by the plant, the different food substances it derives from the soil. Most of these substances are required by vegetable life in a simpler form than that in which they are originally present in the soil; and it is in converting these more or less complex forms of food material into simpler ones, that the usual rôle of the soil microbes consists. It has long been known that the plant absorbs most of its nitrogen in the form of nitric acid, or, more correctly speaking, as nitrates. It has also been long well known that nitrogen, in the form of organic compounds and ammonia, was liable, under certain conditions, to become converted into nitrates in the soil; and this knowledge was put to a practical application, in the manufacture of saltpeter, in the earlier days. In the year 1877, however, it was discovered that this process, to which the name *nitrification* was given, was caused by the action of micro-organic life. Since the year mentioned, further research has revealed that at least two separate forms of bacteria are implicated in this process. The result of these interesting investigations has been to show that the fertility of a soil depends, to a very large extent, on whether or not it is properly stocked with the nitrification bacteria. But a still more interesting discovery was made in the year 1886, by the late Professor Hellriegel and Dr. Wilfarth, of a class of bacteria which infest certain nodules, or fleshy excrescences, to be found on the roots of leguminous plants, and which are able to render the free nitrogen of the air available to the plant.

It should also be added that the power of utilizing the free nitrogen of the air only belongs to certain plants, such as clover, peas, beans, etc.—those generally,

\* The great advantages of the locust (*Robinia pseudacacia*) have been already referred to in former issues of THE FORESTER. As with other leguminous plants its roots are well supplied with bacteroids, perhaps, by means of which it is able to grow rapidly on exceedingly poor soils, and at the same time produce an extremely durable wood which is strong in proportion to its weight and yields an ash very rich in inorganic constituents.



grouped under the term of "leguminous crops." This interesting discovery serves to throw light on the power possessed by certain crops of resuscitating soils on which other crops had been grown, and which had thus become impoverished. It has been found that the organisms suitable for affecting the fixation of nitrogen for certain plants are not able to act in the same capacity for other plants. Professor Nobbe set himself to obtain pure cultures of the fixing bacteria by the usual bacteriological methods. Inasmuch as the different leguminous crops require, as we have already explained, either separate organisms or else different modifications of the same organism, Professor Nobbe has prepared a large number of pure cultivations suited for the commoner leguminous crops grown. These cultures are preserved in glass bottles containing *agar-gelatine*—a commonly used developing medium—and are of eight to ten ounces' capacity. They have to be kept from the influence of the light, and care must be taken not to expose them to a temperature above 98° Fahr. Inoculation of a soil with these cultures, on a practical scale, may be affected in either of two ways. First, the seed of the crop it is desired to inoculate may be inoculated before it is sown. This is effected by making a watery solution of the pure cultivation, immersing the seed in it, and subsequently drying it; or secondly, it may be effected by inoculating a quantity of fine sand, or earth, in the same way, and then spreading it over the field and subsequently working it into the soil to a depth of about three inches.

Naturally, a point of considerable interest is the economic question of the cost of such treatment. It is interesting to learn that this is extremely moderate, as the expense of inoculating a field in this way amounts to the very modest sum of five shillings per acre. This cannot be regarded as expensive, and contrasts favorably with the expense of nitrogenous fertilizers. Not more than a year ago the general application of the principle of soil inoculation was talked about as likely to be made in the future; now it is within measurable distance.

#### The Black Forest.

In ascending the valley of the Rhine with its castled vine-clad crags in one region, and fields of grain, hops, beets, flax and tobacco in another, with here and there plantations of pine (*Pinus sylvestris*), one passes many large rafts of timber. Many of these are on their way to the Netherlands to be used in the construction of wharves. If one follows the course of these masses of timber, he is led into the green spruce forests of Baden. There he will find that the large straight trees, which are of special value for piling in the mud of the low countries, are called "Hollanders" by the timber workers of the Black Forest. It was to see the forests and to learn the methods of planting and cutting that we visited the Grand Duchy of Baden, the most picturesque region in all Germany.

The Black Forest is a mountainous land of beautiful evergreen woods, with fertile valleys and rich, carefully irrigated meadows, with splendid roads and good inns, with a great variety of picturesque dwellings, and with a polite population with peculiar and varied costumes and customs and many interesting industries, such as the manufacture of clocks, kirchwasser, straw hats and printing ink, besides many saw and cellulose mills. The soil of the Black Forest is very fertile in places, the upper strata of rock are mostly a sterile sandstone. In the granite and limestone regions the soil is of course quite fertile.

The Black Forest is so called because of the dark green spruces which predominate in the mountains.

This region is especially worthy of study by Americans for several reasons, chiefly, however, because it is the home of an excellent system of natural regeneration. The total area of Baden is 1,508,113 ha, 550,656 ha of which is in forest. 92,267 ha belong to the State, 4,779 ha to the "hof" or court, 251,460 ha to the communes, 182,885 ha to private individuals, and 19,265 ha to societies. These forests may be divided into at least four classes: coppice oak, forests of *Pinus sylvestris*, mixed forests of silver fir (*Abies pectinata*), spruce (*Abies excelsa*)



and beech (*Fagus sylvatica*), and mixed forests of oak and beech.

One is impressed with the fact that only the increment is cut. The Black Forest saw-mill, although buzzing everywhere along mountain streams, is not a diabolical instrument of destruction. With old-fashioned up-and-down saws it is less voracious than the portable American mill. It saws only the well-earned increment and leaves no desolation in its wake. It saws slowly, utilizes everything, and instead of marring adds to the picturesqueness, and is even an essential part of the life of these fertile and busy little valleys in a country where agriculture, forestry and manufactures are evenly balanced. In spite of a colossal drain on the people for military purposes, Baden is prosperous, and the forest being one of its principal resources is no small factor.

The method employed in naturally regenerating mixed irregular forests is both interesting and very practical, and quite applicable to America, where good forest soil is plentiful, where there are many valuable timber species, and where natural regeneration is prompt and vigorous.

In many parts of Europe certain areas are planted in trees of one kind, such as *Pinus sylvestris*. The trees on the different sections are of various ages. When those on one section reach maturity they are cut and others are planted. These are planted with the small trees which have been carefully reared in nurseries. Another example is where sections of coppice oak, the bark of which is used for tanning purposes, are cut at regular intervals. In this work a great deal of skill is not necessary, although it is of course much superior to the American method, which is, however, no method at all.

This is the simplest kind of silviculture. In certain regions, however, it is necessary to plant in this way. A forest of only one species is more apt to suffer from the ravages of insects, and a part of the surface is bare for a time. The forest has a very artificial appearance, and the young trees suffer in being transplanted. In this kind of forestry all that is neces-

sary is to grow the species desired in nurseries and then transplant them, and when they have reached the proper size cut them and transport the timber.

This system is resorted to mainly in regions where natural regeneration is difficult or impossible. By far the most interesting system in every way is to plant with the axe—that is, to keep the forest in such a state that by a certain method of skillful cutting the forest is naturally regenerated in the proper way. It always remains the same in quality or improves and at the same time yields a small income constantly. A small amount of planting is usually necessary, however, here and there, especially in places which have suffered from wind-falls or where the combination and equilibrium have been destroyed by disease or other causes. A forest properly treated in this way is very beautiful, an improvement, in fact, on the natural woods.

It requires, however, a great deal of skill and a perfect knowledge of the species with which one is dealing. One of the secrets of this system is to know just how the different species disport themselves in varying quantities of light, since the amount of light determines the amount of seed and the kind of young growth which follows. The light-demanding and shade-enduring kinds are grown together. Almost everywhere throughout Europe the beech is a famous underwood. Although it serves only for fuel when cut, it is of inestimable value in forming a rich covering of humus which enriches and protects the soil. Much more will be said in other issues of THE FORESTER concerning this system, which can be employed with great profit to American forests. No one refrains from reproaching the American people, the possessors of such extensive natural woods, for their recklessness, after a visit to these magnificent and profitable forests. Our lumbering operations are systems of robbery, our recklessness with fire a crime in comparison with the treatment of the forests of Baden, where the light and shade conditions of every species are carefully studied, and where the delicate and intricate workings of nature are in

the hands of the forester, who almost dictates the kind of seed which must fall, and the kind of tree which must grow in the spot he has prepared for it. J. G.

#### Paper and Wood Pulp.

Since Niagara has been harnessed numerous industries have sprung up about her to profit by her draught. A very noticeable sight to the visitor is a small forest of cord-wood lying in piles in the shadow of an immense chimney rising from a large factory building. The wood is Canada spruce for making wood paper. An attendant conducted our party through the works. We saw the cord-wood sawed into ten-inch billets, barked, revolved between great, grinding steel jaws and reduced to shreds, then ground still more finely, washed and passed to the chemical vats.

When the pulp is ready for the press, the spruce trees, thus reduced, are mixed with sufficient water to make a semifluid mass, and this is squirted through jets upon a moving band of cloth which passes between a long series of steaming and pressing cylinders until all the water is squeezed and dried out of it and it is reeled up at the outer end ready for the market.

The Niagara paper all seemed brownish and of an inferior quality.

An article entitled "*la papier*," in the *Revue des Deux-Mondes* of recent issue, has the following statement in regard to wood-pulp in France: All kinds of wood will answer for paper-making, but the quality and quantity of the product differ widely; 100 parts of oak or walnut will only furnish 26 to 29 parts of pulp, while 38 parts may be obtained from the same weight of willow or chestnut. The aspen (*tremble*) gives a very white paper, massy but of slight tenacity. A mixture of 95 per cent. fir (*sapin*) and 5 per cent. aspen gives a good result.

The fir is exported from Norway, either as short logs (a length of 1.10 metres will avoid the payment of the French duty), or as damp pulp ready for the chemical process. The process is known as the bisulphite method. Its details are not yet made public.

N. W.

#### Wood Used by Cabinet Makers.

In a recent issue of *l'Echo Forestier*, appears a descriptive list of the various rare woods used in cabinet-making. It might be of interest to give the list entire.

Amboyna wood\* is one of the most precious known. It has much the appearance of the choicest elm-knots,† though of greater delicacy. On account of its rarity, it is seldom used for furniture, though small coffers and clock-cases are made of it.

Close upon this follows black ebony, much of which is brought from Africa, though the most beautiful varieties come from the island of Mauritius. Green ebony, of a dark olive-green color is furnished by Madagascar. Portugal ebony,‡ from South America, is veined black and fawn color. Guaiac wood,|| of a greenish-brown, comes from America. Pomegranate wood, dark green, a native of Cochin China. Iron wood, dark brown, very dense and heavy, an American product. Bois d'Amourette,§ from China, veined red and black, and much in demand. Agra, or perfumed wood, of a dark brown, also from China. The island service-tree,¶ dark brown, from the Antilles. The cocoa palms, from Africa, Asia and America. Coral-wood,\*\* of a beautiful red tint; and sandal wood, in shades passing from dark red to pale yellow, all from India. Bamboo, in different shades, from different countries.

\* Bois d'amboine, from the island Amboyna of the Dutch Moluccas. Reported, though with doubt, as *Plindersia Amboinensis*, Poir., of the natural order Meliaceae, allied to the geranium family.

† Loupe d'orme; of elm knots, or excrescences, pretty knic-knacks and toys are often made, though they never grow large enough for the purposes of cabinet-makers.

‡ Portugal ebony is not a true ebony, but belongs to the natural order Leguminosae, and is closely related to our native honey-locust (*Gleditsia triacanthos*). The true, or black ebony, are of the natural order Ebenaceae, and of the genus *Diospyros*, of which our native persimmon (*D. Virginiana*) is a species.

|| Guaiac-wood is from the tree *Guaiacum officinale*, L., a relative of the winter-ash (*Ptelea*) common along our more southern streams. The wood contains the resin known to medicine.

§ Bois d'amourette, a name, but awkwardly translatable. It is from the tree *Acacia tennifolia*, Willd., belonging to the natural order Leguminosae, and also a relative of the honey-locust and wild-sensitive plant.

¶ Service tree; a tree nearly related to our mountain-ash and choke-berry; *Pyrus aucuparia*, L., belonging to the natural order Rosaceae.

\*\* Coral-wood is from the tree *Adenanthera pavonina*, also of the Mimosa division of the natural order Leguminosae. Another name is pea-coral. Its seeds are said to be of such uniform weight that they are used in the East for estimating the weight of jewels.

Letter-wood,\* of variable red, from America. Partridge-wood,† gray-brown, from Martinique.

This list is sufficient to give an idea of the variety and richness of the darker woods used in cabinet-making. In regard to the lighter colored woods a word may be said.

As mahogany‡ might be regarded as the type of the darker colored woods, maple might be taken as the type of those of a lighter color. The finest maple is from America. It is very difficult to work and requires skilled hands, because the slightest bungling makes irreparable blemishes on its fair, light surface. There is no recourse to mastic or patching, as in the case of darker woods. Like mahogany, maple occurs in many varieties.

Maple knots occur in varying depths of color. They are a very rare article, and are never employed in making anything but clock cases and fancy coffers. Silver maple knots are more frequently employed, though the wood is almost as rare.

The speckled maple is sometimes very white and dotted with fairly regular and close spots. It commands about the same price as ordinary mahogany, or about \$4.00 per hundred weight (40 to 50 francs per quintal).

The gray, wavy maple (*Perable ondule*) gives the beautiful zig-zag effect of marble, and brings about the same price as the last.

Finally, the silver maple, a wood of great whiteness and taking a high polish. It is in great demand. In spite of its uniformity in coloring, it holds its place on the market on a par with the other varieties.

This last, as well as the speckled wood, is often used in the manufacture of entire pieces of furniture, while the other varieties are only used in veneering.

Citron-wood,|| which is often wrongly

called the wood of the citron tree, is also known as rose-wood of the Antilles, and has no connection with the citron tree. The name citron-wood has been given it either by reason of its color, which is a pleasing yellow, or by reason of the faint aromatic odor it exhales while being worked. It is exquisite in grain and contrasts well with violet ebony. The so-called citron-wood furniture is justly much prized, but it is more suitable for mosaics and ornamental mouldings, or rose-work.

In conclusion, there might be named among the light colored woods the cedar, so highly esteemed by the ancients. Though it comes in many colors, the most frequent is the rose-veined. We might also mention the white cinnamon, of Ceylon; the variegated white gum, of Guadeloupe; the gray laurel, of Mauritius; the West India rose-wood; the Jamaica balsam, and the tawny cypress, of Greece.

N. W

“La Société centrale forestière de Belgique,” founded May 1, 1893, counted on December 31, 1895, in all a membership of 1004. To celebrate this landmark in its history the society held a subscription banquet at its quarters in Ixelles “Aux Caves de Maëstricht.” The reunion was opened two hours previous to the banquet by M. C. Professor Bommer, the subject of his lecture being “Diseases of trees caused by fungi.”

This society is actively engaged in the popularisation of silviculture, and its monthly bulletin January 15, 1896, contains an excellent report of M. Pariset on this subject. “To awake, augment and spread among the populace sentiments in favor of forests there is no means,” said he, “more efficient than that of lectures.” The society determined to establish forestry lectures, adapted for adult audiences, and in charge of nomadic professors, somewhat after the fashion, so successfully adopted in France, by the professors of the Agricultural Department.—*Translated from Revue des Eaux et Forêts.*

\* *Bois de lettres*; furnished by *Piratinera Guianensis*, Aubl., a tree of the elm-family, native in Guiana.

† *Bois de perdrix*; a species of *Bocoe*, of the natural order Leguminosae.

‡ The author supposed his readers to be so well acquainted with it that he gave no description. It is a tree native to tropical America—*Swietenia mahogani*, L., of the natural order Meliaceae.

|| *Bois de citron*; the French name for *Erithalis fruticosus*, of the order Rubiaceae, and not to be confused with

the product known in English by the same name, i. e., *Callitris quadrivalvis*, a conifer of Africa yielding the gum-resin sandarac.

#### The Indian Foresters.

OF the wheels of public service that turn under the Indian Government there is none more important than the Department of Woods and Forests. The reboisement of all India is in its hands, or will be when Government has the money to spare. Its servants wrestle with wandering sand torrents and shifting dunes, wattling them at the sides, damming them in front, and pegging them down atop with coarse grass and unhappy pine after the rules of Nancy. They are responsible for all the timber in the state forests of the Himalays, as well as for the denuded hillsides that the monsoons wash into dry gullies and aching ravines, each cut a mouth crying aloud what carelessness can do. They experiment with battalions of foreign trees, and coax the blue gum to take root and perhaps dry up the canal fever. In the plains the chief part of their duty is to see that the belt fire-lines in the forest reserves are kept clean, so that when drouth comes and the cattle starve, they may throw the reserve open to the villagers' herds and allow the man himself to gather sticks. They poll and lop for the stacked railway fuel along the lines that burn no coal, they calculate the profit of their plantations to five points of decimals, they are the doctors and midwives of the huge teak forests of Upper Burmah, the rubber of the Eastern jungles, and they are always hampered by lack of funds. But since a forest officer's business takes him far from the beaten track and the regular stations, he learns to grow wise in more than wood-lore alone, to know the people and the polity of the jungle, meeting tiger, leopard, bear, wild dog, and all the deer, not once or twice after days of beating, but again and again in the execution of his duty. He spends much time in saddle or under canvass, the friend of newly-planted trees, the associate of uncouth rangers and hairy trackers, till the woods that show his care in turn set their mark upon him, and he ceases to sing the naughty French songs he learned at Nancy, and grows silent with the silent things of the undergrowth. — *Kipling in McClure's Magazine for June, 1896.*

The value of fire lanes in forests traversed by lines of railway is well illustrated by an experiment tried near Quenoy, France.

Here, rapid trains set continual fires during the dry season, and between the years 1883-1892, forest to the area of 43 hectares was destroyed, with a consequent loss of timber valued at 32,000 francs.

Fire lanes 3 metres wide were built each side of the lines at 20 or 30 metres from the tracks, and every 50 metres, paths 1.5 metres wide were surveyed at right angles to the lanes extending between the lanes and the tracks. The paths were kept free from vegetation during the dry season. The cost of maintenance, which consists of the cost of constructing the lanes and the labor of clearing the path, amount to 235 francs a year.

Since the application of this plan, damages, which amounted previously to 3,195 francs per year, were reduced to less than 20 francs per year. The figures speak for themselves. N. W.

Every one knows the instinct of the boy animal for collecting—it matters very little what—postage stamps, coins, turtles or rabbits, as opportunity affords. When we remember that science or precise knowledge never springs, Minerva-like, into existence, but develops from the boyish curiosity of young Cuviers and Lamarcks and Lyells concerning the natural world, it is easy to perceive the great importance of the books that are put into the hands of amateur collectors. Gilbert White's "Selborn," a book that stands at the parting of the ways between the literature of the old and that of the new school of natural history, was read with eagerness by Darwin in his youth. It doubtless stimulated him to the exercise of his power of careful observation, and increased, if it did not awaken, his interest in the lives of birds and insects. — *New York Times.*

The first of a series of forestry lectures under the auspices of the New Jersey Forestry Association will be delivered by Captain Charles McIvaine, in Haddonfield, on the 12th of December.

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